CLAIMS

What is claimed is:

1. An apparatus to simultaneously conduct multiple chemical reactions comprising:

a plate having a plurality of spatially arranged wells, a well having a deformable closed end, a sidewall, and an open end opposite to the closed end; and

an array having a plurality of sets of chemical reactants bound to a surface of the array in a spatial arrangement similar to the spatially arranged wells,

wherein when assembled, the array covers the open ends of the wells in the plate to form a reaction assembly having a plurality of closed cells that is one or more of gas tight, liquid tight, and fluid tight.

2. The apparatus of Claim 1, wherein the deformable closed end of the well deforms into a respective well space toward the open end with an application of force with a blunt tool.

3. The apparatus of Claim 2, wherein the deformable closed end is elastomeric and returns to an original position when the applied blunt force is removed.

4. The apparatus of Claim 1, wherein the plate further comprises a deformable film fixed to a plate surface that covers a plurality of well spaces to form the deformable closed ends of the wells, the deformable closed end of a well deforming into a well space toward the open end with an application of blunt force.

5. The apparatus of Claim 1, wherein the plate further comprises a deformable film fixed to a first plate surface adjacent to the open ends, the deformable film being formed into well spaces of the plurality of wells to adjacent a second plate surface to form the deformable closed ends such that the well sidewalls also are deformable, a deformable sidewall and the deformable closed end deforming into a well space toward the open end with an application of blunt force.

6. The apparatus of Claim 5, wherein the deformable film is flexible, such that when assembled, the flexible film is fixed between the plate and the array to facilitate a reaction assembly seal that is the one or more of gas tight, fluid tight and liquid tight.

7. The apparatus of Claim 1, wherein the array is a multi array device, the multi array device comprising a foundation support, a plurality of prongs extending from the foundation support, and an array substrate having a set of bound chemical reactants fixed to a distal end of a prong, the plurality of prongs being spatially arranged similar to the wells, such that when assembled, a prong extends into a respective well of the plate.

8. The apparatus of Claim 7, wherein the foundation support is flexible, such that when assembled, the flexible foundation support facilitates a reaction assembly seal that is the one or more of gas tight, fluid tight and liquid tight.

9. The apparatus of Claim 7, wherein at least one prong of the plurality comprises a collar that radially extends from the prong, such that when assembled, the collar limits a distance that the prong extends into the closed cell.

10. The apparatus of Claim 9, wherein the collar is a resilient material, such that when assembled, the collar of the prong interfaces to the open end of the well to form the closed cell.

11. The apparatus of Claim 1, wherein a well receives a test sample at the open end before assembly, a closed cell comprising a set of array-bound chemical reactants and the test sample.

12. The apparatus of Claim 11, wherein when assembled, the deformable closed end of the closed cell deforms into a respective well space with an application of blunt force, the deformed closed end displacing the test sample from the closed end toward the set of array-bound chemical reactants in the closed cell.

13. The apparatus of Claim 1, further comprising one or more of mechanical clamps, radiation, heat, external fluid pressure, vacuum, an adhesive and a pliable gasket, the pliable gasket having a plurality of throughholes spatially arranged similar to the arrangement of wells and the array, such that when assembled, the gasket is between the plate and the array.

14. An apparatus to simultaneously conduct multiple chemical reactions comprising:

a plate having a plurality of spatially arranged wells, a well having a closed end, a sidewall, and an open end opposite to the closed end; and

a multi array device comprising a foundation support, a plurality of prongs extending from the foundation support in a spatial arrangement similar to the spatial arrangement of the wells, and sets of chemical reactants bound to distal ends of the prongs,

wherein when assembled, the multi array device covers the open ends of the wells to form a reaction assembly having a plurality of closed cells that is one or more of gas tight, liquid tight, and fluid tight.

15. The apparatus of Claim 14, wherein a closed cell comprises a test sample and a prong having a set of the chemical reactants, the open end of the well for receiving the test sample before assembly.

16. The apparatus of Claim 14, wherein the plate is a flexible multi-well plate, at least a closed end of each well in the flexible multi-well plate being deformable, such that an application of blunt force to the deformable closed end deforms the closed end into a respective well space.

17. The apparatus of Claim 16, wherein when assembled, a closed cell comprises a test sample and a prong having a set of prong-bound chemical reactants, the application of force displacing the test sample toward the set of chemical reactants bound to the prong in the closed cell.

18. A method of simultaneously conducting multiple chemical reactions comprising:

providing an array of sets of chemical reactants bound to an array surface; and

providing a plate of wells spatially arranged similar to the array of sets, a well having a deformable closed end and an open end opposite the closed end,

wherein when assembled, the array covers the open ends of the wells to form a reaction assembly having a plurality of closed cells that is one or more of a gas tight, a liquid tight, and a fluid tight to simultaneously conduct multiple chemical reactions.

19. The method of Claim 18, wherein the array comprises a foundation support, a plurality of prongs extending from the foundation support, and a set of chemical reactants bound to a distal end of a prong, wherein when assembled, a closed cell comprises a prong such that a respective set of prong-bound chemical reactants extend into the closed cell.

20. The method of Claim 19, wherein the foundation support is a flexible substrate, such that when assembled, the flexible foundation support facilitates a reaction assembly seal that is the one or more of gas tight, liquid tight, and fluid tight.

21. The method of Claim 18, further comprising:

providing a test sample in the well via the open end; and

assembling the array to the plate, such that a closed cell comprises a set of chemical reactants bound to the array surface and the test sample.

22. The method of Claim 21, further comprising contacting the test sample with the set of chemical reactants in the closed cell, wherein contacting comprises deforming the deformable closed end to displace the test sample toward the set of array-bound chemical reactants.

23. The method of Claim 21, wherein assembling comprises:

applying one or more of mechanical clamps, radiation, heat, external fluid pressure, vacuum, an adhesive and a pliable gasket to join the array and the plate, the

gasket having a spatial arrangement of throughholes that aligns with the wells and the array.

24. The method of Claim 23, wherein the gasket further has at least one channel that interconnects at least two throughholes, such that the reaction assembly has at least two closed cells that are interconnected.

25. The method of Claim 24, further comprising contacting the test sample to the set of array-bound chemical reactants, wherein contacting comprises mechanically agitating the reaction assembly, the agitation having an acceleration, and wherein mechanically agitating comprises incrementally increasing the acceleration to sequentially mix the test samples of the interconnected closed cells.

26. The method of Claim 22, wherein a well further comprises a deformable sidewall that extends between the deformable closed end and the open end, and wherein when assembled, deforming the deformable closed end collapses the deformable sidewall to displace the test sample.

27. The method of Claim 22, wherein deforming comprises using a pin tool to push the deformable closed end.

28. The method of Claim 27, wherein the pin tool comprises an array of blunt pins spatially arranged to align with the plurality of closed cells, a cell corresponding to at least one pin of the pin tool to push the deformable closed end of the cell, and wherein deforming further comprises pushing the deformable closed end with a pin to mix the test sample with the set of array-bound chemical reactants in the closed cell.

29. The method of Claim 22, further comprising washing the array after contacting, wherein washing comprises puncturing the deformable closed end of the closed cell with a needle; and introducing a fluid into the punctured end to wash the array or dilute the test sample.

30. The method of Claim 29, further comprising removing the fluid and any residual test sample through the punctured end.

31. A kit to simultaneously conduct multiple different assays of biological materials comprising:

an array having a plurality of sets of a first biological material bound to an array substrate in a spatial arrangement; and

a plate having a plurality of spatially arranged wells in the plate, the wells being closed at one end with a flexible end wall and open at an opposite end,

wherein when assembled, the array covers the open ends of the wells in the plate to form a reaction assembly having multiple closed reaction cells that are one or more of gas, fluid or liquid tight.

32. The kit of Claim 31, wherein when assembled, a closed reaction cell comprises a second biological material and a set of the first biological material, the open end of a well for receiving a second biological material before assembly.

33. The kit of Claim 31, wherein the array substrate comprises a plurality of spatially arranged prongs extending from the substrate, a set of the first biological material being bound to a distal end of an array prong.

34. The kit of Claim 31, wherein the plate comprises a flexible film fixed to the plate, the plate having throughholes, the flexible film covering one end of the throughholes to form the flexible end walls of the plate.

35. The kit of Claim 31, wherein the plate comprises a flexible film fixed to the plate, the flexible film extended into throughholes in the plate to form the wells having the flexible end wall, the open end, and a flexible sidewall, the flexible end wall being accessible from a through hole opening in the plate adjacent to the flexible end wall.